PROJECT – Thermistor Control with LabVIEW

Objective:

Acquire thermistor signal using Arduino's analog input and LabVIEW to measure temperature in Celsius degree.

Requirements:

-Moving average filtering (50 samples length) will be applied for filtering (Hint: sample collector and mean block can be used)

- Deploy appropriate signal converting /conditioning formulas, when supply voltage of the circuit is 5 volts, resistor (R1) is 1kΩ, and the NTC has 2kΩ resistance @ 25 °C. β=4100.

-Add a numeric and graphical indicator to show temperature in °C

-At least two pages in PDF including

Equations and Calculations:

- Resistor Equations:
  V_{CC} = 5V
  R=2000 Ω

$$R_x = \frac{R * (V_{ADC})}{V_{CC} - V_{ADC}}$$

- Temperature Equations:

$$T = \frac{1}{\frac{\ln(\frac{R_x}{R_0})}{\beta} + \frac{1}{T_0}}$$

Kelvin to Centigrade

$$T(℃) = T - 273{,}15$$

Summary

For read analog voltage from Arduino;

1. Connect Arduino (Figure 1.5)
2. Initialize Arduino (Figure 1.1 and Figure 1.2)
3. Continuous Acquisition for Sample rate and Analog voltage pin (Figure 1.1 and Figure 1.2)
   Sample Rate= 1000 Hz
   Samples to Read= 50
   Analog Voltage Pin= 0
4. Continuous Acquisition Sample for Mean input voltage (Figure 1.1 and Figure 1.2)
5. Formulas (Figure 1.3 and Figure 1.4)
6. Outputs (Figure 1.6)

For system working test "Set Voltage for Simulation" knob connected as shown in Figure 1.2.

Block Diagram:

The project is created in the block diagram for the operation to be performed.

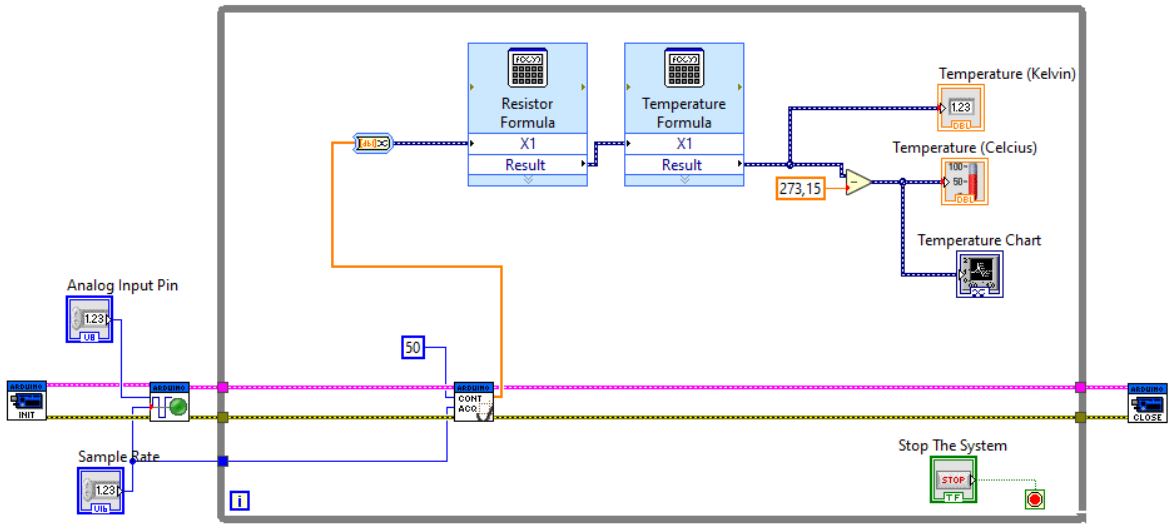

Figure 1.1 – Block Diagram of System

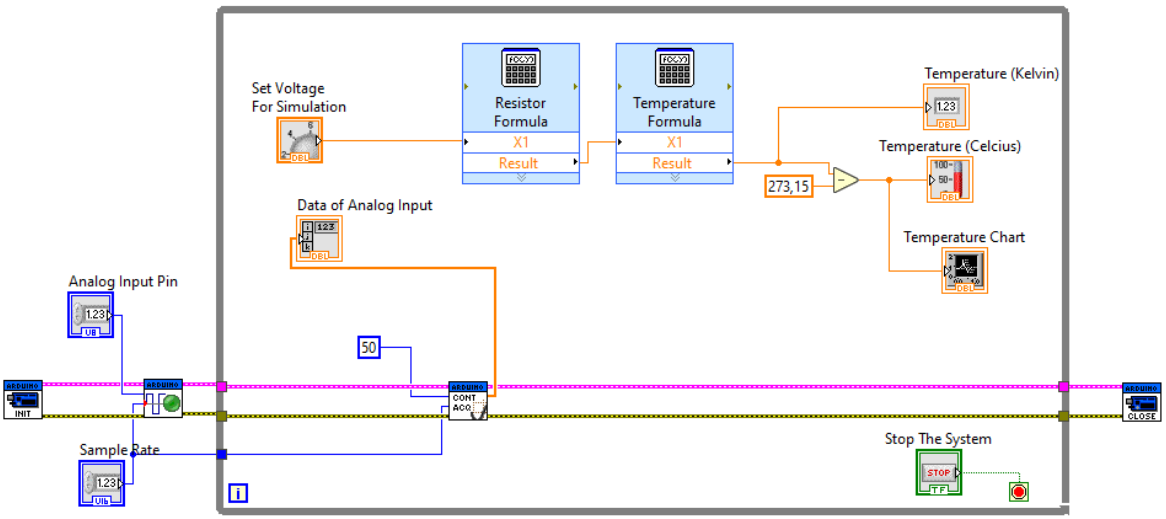

Figure 1.2 – Block Diagram for System Simulation

Formulas:

In accordance with Resistor Equation

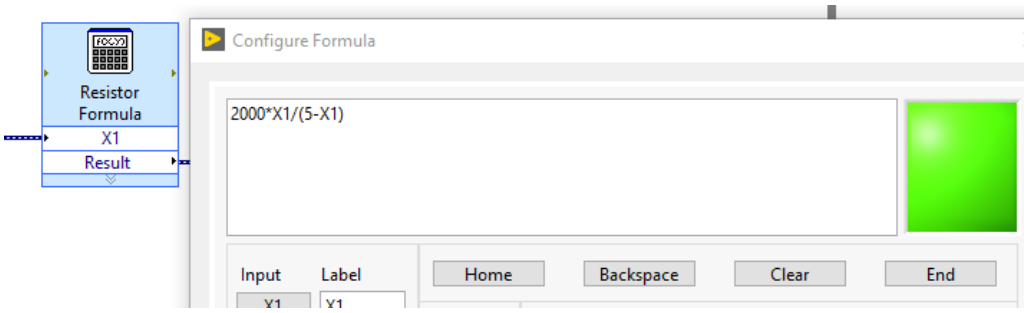

Figure 1.3 – Formula of Resistor

In accordance with Temperature Equation

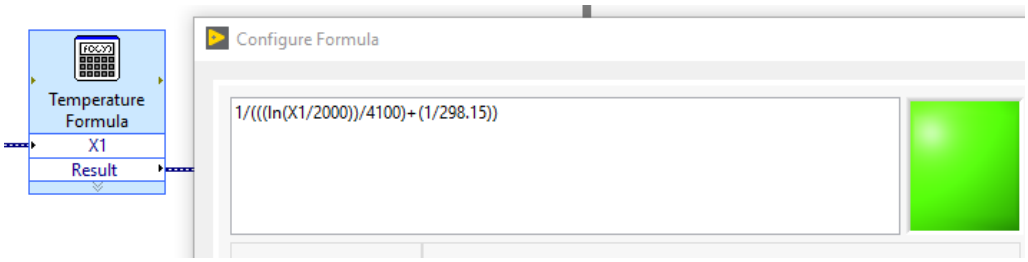

Figure 1.4 – Formula of Temperature

Connection Diagram:

Thermistor connected Analog Input 0 (AI0) pin on Arduino board.

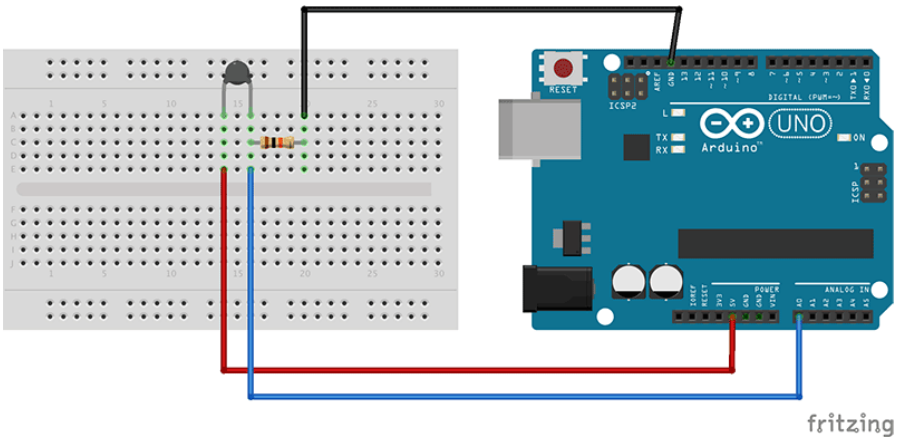

Figure 1.5 – Connection Diagram of Arduino and Thermistor

Front Panel:

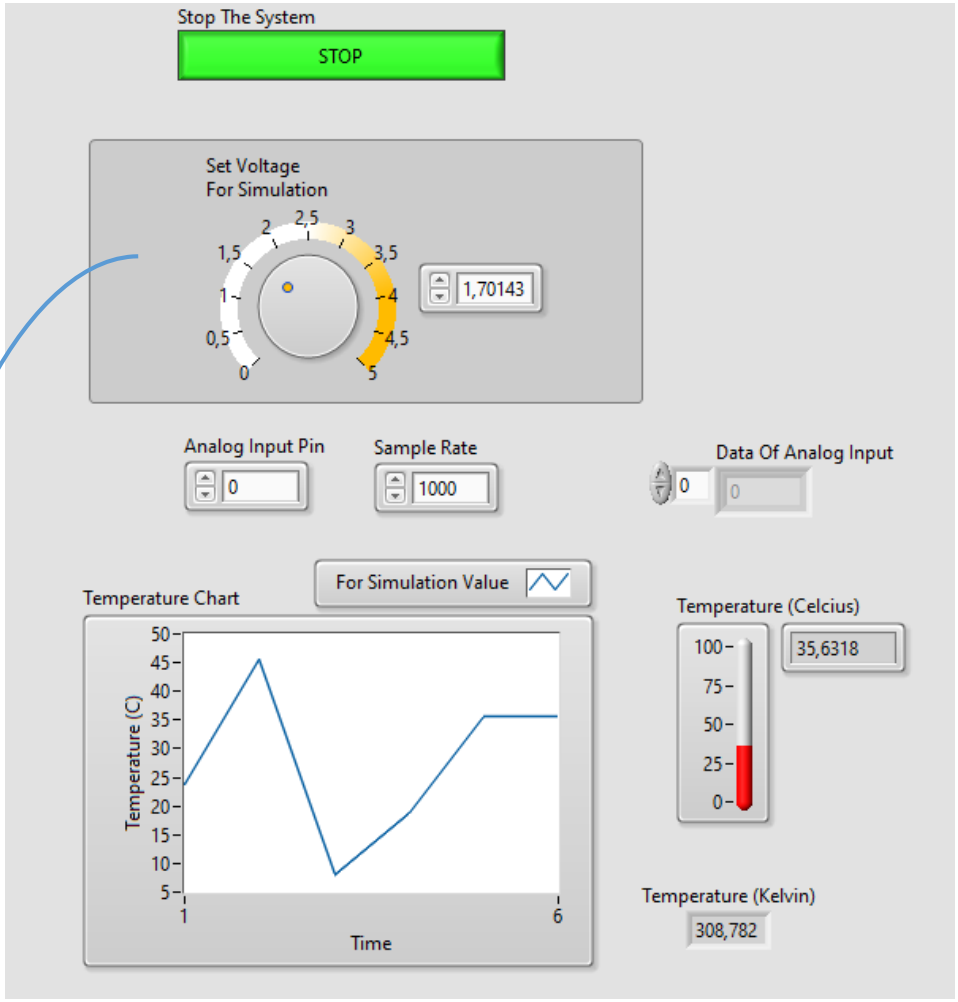

Figure 1.6 – System Working State (Simulation)

For system simulation (Figure 1.2)